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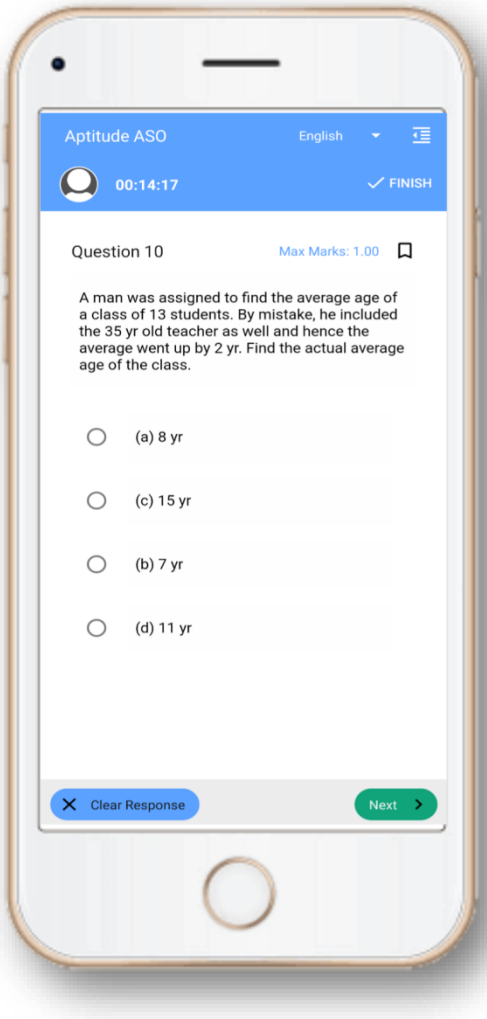


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**B – SECTION – III**

**SCIENCE (PCM)**

**MATHEMATICS**

81. If a line passing through ( 3, $k$ ) and ( 2, 7 ) is parallel to the line passing through ( – 1, 4 ) and ( 0, 6 ), then what is the value of $k$ ?

(A) 6 (B) 7

(C) 8 (D) 9

82. What is the equation of the circle with centre at the mid-point of the line segment joining the points ( 1, 1 ) and ( 3, 3 ) and radius ?

(A) $x^2 + y^2 - 4(x + y) + 7 = 0$

(B) $x^2 + y^2 - 4(x + y) + 8 = 0$

(C) $x^2 + y^2 + 4(x + y)$

(D) $x^2 + y^2 + 4(x + y) + 8 = 0$

83. What is the diameter of the sphere ?

$x^2 + y^2 + z^2 - 16x + 12y - 2\sqrt{d}\,z + d = 0$

(A) 40

(B) 20

(C) 10

(D) 5

84. A box contains 100 bulbs out of which 10 are defective. What is the probability that out of a sample of 5 bulbs, exactly 3 are defective ?

(A) $\frac{9^3}{105}$

(B) $\frac{9^2}{10^4}$

(C) $\frac{9}{10^3}$

(D) $\frac{9^3}{10^4}$

85. What is the variance of first five positive integers ?

(A) $\sqrt{2}$ (B) $2\sqrt{2}$

(C) 8 (D) 20

86. If $|A| = 50$, $|A \cap B| = 45$ and $|B| = 48$, then what is $P(A - B)$ ?

(A) $2^3$

(B) $2^2$

(C) $2^5$

(D) 2

87. Which of the following relations from $A = \{a, b, c\}$ to $B = \{a, b, c, d\}$ is a function ?

(A) $\{(a, b), (b, c), (c, d), (b, b)\}$

(B) $\{(b, b), (c, c), (a, a), (d, d)\}$

(C) $\{(a, b), (b, c)\}$

(D) $\{(a, a), (b, c), (c, d)\}$

88. If $A = \{(5, 6)\}$ and $B = \{7, 8\}$, then what is the number of relations from $A$ to $B$ ?

(A) $2^2$ (B) $2^3$

(C) $2^4$ (D) $2^5$

89. What is the number of divisors of 864 ?

(A) 24 (B) 30

(C) 36 (D) 42

90. If one of the roots of the quadratic equation $x^2 - 5x + p = 0$ is 3 more than the other, then what is the value of $p$ ?

(A) 1 (B) 2

(C) 3 (D) 4

91. $ABCD$ is a quadrilateral. What is the value of $\cos \frac{1}{2}(A + C) + \cos \frac{1}{2}(B + D)$ ?

(A) 0

(B) 1

(C) $\sin \frac{1}{2}(B + D)$

(D) $\cos \frac{1}{2}(B + D)$

92. What is the maximum value of $\sin \theta \cdot \cos \theta$ ?

(A) 1

(B) $\frac{1}{2}$

(C) 2

(D) 3

93. If the length of a side of an equilateral triangle is $2\sqrt{3}$ cm, then what is the radius of its circumcircle ?

(A) 1

(B) 2

(C) 3

(D) 4





( Continued )

94. A horse is placed for grazing inside a rectangular field 40 m by 36 m and tethered to a corner by a rope 14 m long. Over how much area can it graze ? ( Take $\pi = \frac{22}{7}$ )

(A) 150 $m^2$

(B) 152 $m^2$

(C) 151 $m^2$

(D) 154 $m^2$

95. What is the cofactor $a_{23}$ of the matrix $\begin{bmatrix} -1 & 2 & 1 \\ -2 & 1 & 2 \\ 1 & 3 & -1 \end{bmatrix}$ ?

(A) – 5

(B) – 1

(C) 5

(D) 1

96. What about the set of natural numbers > 1 under multiplication ?

(A) It is a group

(B) It is a semigroup

(C) It is a monoid

(D) It is a subgroup

97. If $x = 2t$ and $y = 2t^2$, then what is $\frac{dy}{dx}$ ?

(A) $x$

(B) $2x$

(C) $x^2$

(D) $\frac{x}{2}$

98. What is the value of $\lim_{x \to 0} \frac{\sin x^\circ}{x}$ ?

(A) $\pi$

(B) 1

(C) $\frac{\pi}{180}$

(D) $\frac{180}{\pi}$

99. A.M. of two numbers $a$ and $b$ is 6 and GM of these numbers is 4, then what is $|\sqrt{a} - \sqrt{b}|$ ?

(A) 2 (B) 4

(C) 6 (D) 12

100. $x^2 - \frac{x^6}{3!} + \frac{x^{10}}{5!} - \ldots$ is Maclaurin series of which function ?

(A) $\cos x$

(B) $e^{x^2}$

(C) $\cos x^2$

(D) $\sin x^2$.